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NOTES ON THE PIKAS OF COLORADO.

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Ochotona saxatilis Bangs was originally described from Montgomery, near Mt. Lincoln, Park County, Colorado. So far as we are aware it has not been found outside of Colorado. Until recently all the pikas of that State were supposed to belong to this form. A year ago Dr. Allen described *Ochotona figginsi* from Pagoda Peak, Routt County, Colorado.* The type localities of these two forms are only about 90 miles apart, but are separated by a broad zone of territory entirely unsuited to pikas, which in the southern Rockies are seldom found below 9000 feet and are not usually abundant below 10,000. The *saxatilis* locality is connected with the Front Range and with the Sangre de Cristo Range by almost continuous altitudes of 9000 feet or over. Hence *saxatilis* should be expected all along the crests of the eastern mountains practically from the northern to the southern boundary of the State. On the other hand, the *figginsi* locality is in an isolated mountain area, separated on all sides from other high mountains by territory unfavorable to this genus, so one should expect a distinct race to develop there. The San Juan region to the southwest also forms a rather distinct mountain mass, but it is really connected with the eastern ranges by territory more or less favorable to pikas, so that it is not so likely that the San Juan pikas would be distinct, though by no means unlikely. The form which occurs in the range west of North Park may also prove to be distinct, though not as thoroughly isolated as the Pagoda Peak region. All of these topographic features will clearly appear to the reader unfamiliar with the region, upon consulting the new topographic map of

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the State soon to be issued by the Colorado Geological Survey, a proof sheet of which had been furnished to us. The map will also aid in comprehending the geological history of the region which has led to the isolation of groups of plants and animals of restricted altitudinal range.

Owing to seasonal differences in pelage colors, as well as differences due to age, the diagnosis of closely related forms of this genus is difficult and unsatisfactory unless one has access to numerous specimens, representing various localities and various seasons.

In the University of Colorado Museum are two specimens taken at Trappers' Lake by Mr. A. H. Felger, of Denver, August 31, 1909, and three more in his collection, taken the same day at the same place. All are females and apparently all young, though full grown. Trappers' Lake is about nine or ten miles south of Pagoda Peak, and the two localities are connected by an unbroken mountain divide which should be just as favorable to these animals as either of the special localities mentioned, so far as one may judge by observing the divide from the valley, without actually traversing it. However, the description of *figginsi* does not exactly fit the Trappers' Lake specimens. This is likely due to difference in season, as the *figginsi* type was taken on October 30, two months later than the Trappers' Lake specimens, the former thus representing the winter pelage, while the latter represents the worn summer pelage. There is also considerable variation in the colors of the Trappers' Lake specimens themselves, due possibly to difference in age, though that is doubtful. Dr. Allen's comparison was based upon winter pelage.

We have compared these specimens with four from the Front Range, taken near timber line, west and southwest of Boulder, one on July 21, two on July 24, and one on August 26, hence all representing summer pelage. Individually some specimens from the two localities are scarcely distinguishable; collectively, with the two lots placed in separate rows, side by side, the difference is clear. This, as is well known, is often true of various forms of *Peromyscus*. Assuming that the Trappers' Lake lot are true *figginsi*, and that the Front Range lot are true *saxatilis*, the *figginsi* lot as a whole is considerably darker above than the *saxatilis* lot. This is owing to a larger proportion of black and

dark ochraceous mixed with the gray. This difference, however, is not uniform. One of the *figginsi* has rather more of the gray than one of the *saxatilis*, and these two, with another somewhat darker *figginsi*, form an almost complete series grading from one form to the other. Below, the *saxatilis* lot is nearly white, with a very light wash of buff, while *figginsi* has a stronger wash of ochraceous buff, especially well defined along the medial ventral surface, somewhat lighter in two specimens, these two being the same ones that are lighter above than the other three. In the ventral colors, as in the dorsal, we find an almost complete gradation between the two forms. It is notable that the difference in the ventral surface of the two forms is the exact reverse of that noted by Dr. Allen in the winter pelage. He says *saxatilis* is "pale buff, with the pectoral band approaching ochraceous buff; in *figginsi* it is white with a pale yellowish wash, a little stronger and more buffy on the pectoral band, but not of the deep buff seen in *saxatilis*." In other words, if our specimens are true *figginsi* and *saxatilis*, then the difference in the ventral surface in winter pelage is the exact reverse of the difference in summer pelage. The crowns of all our *figginsi* are much darker than in our *saxatilis*, and with a distinct vinaceous cast. In this respect the tendency to intergrade is much less than in any other respect. The following are the measurements in the flesh, in millimeters, which do not help us much:

	Length.	Hind Foot.	Tail.
Jenny Lake, Gilpin County,	192	26	
Jenny Lake, Gilpin County,	180	25	
Corona, Gilpin County,	185	30	
Camp Albion, Boulder County,	200	30	14
Trappers' Lake,	200	28	12
Trappers' Lake,	199	25	11
Trappers' Lake,	187	27	11
Trappers' Lake,	163	27	11
Trappers' Lake,	174	26	11

We have in Colorado clearly two races. Whether they should be deemed distinct species may be less certain. From the evidence at hand we should call them subspecies, in which event the new form should be called *Ochotona saxatilis figginsi* (Allen).

The chief point of interest in these two forms is that they

probably represent the definite results of the coming and going of the glaciers. Prior to the glacial epoch, if *Ochotona* existed at all in Colorado, the genus was likely confined to the highest mountains. During that epoch glaciers pushed down all the valleys from the higher mountains, and climatic conditions were favorable for the extension of the range of pikas southward and to lower altitudes, thus enabling them to span the low lands separating our mountain masses in the west and southwest. With the next change of climate which caused the retreat of glaciers, the lower limit of favorable habitat must have again risen, leaving the Pagoda Peak stock and many others in similar situations, stranded, isolated from the parental stock by the intervening unfavorable territory. The alpine and subalpine plants and animals of the isolated mountain masses of the West afford great opportunities for the study of the effect of isolation upon variation and the origin of new species.